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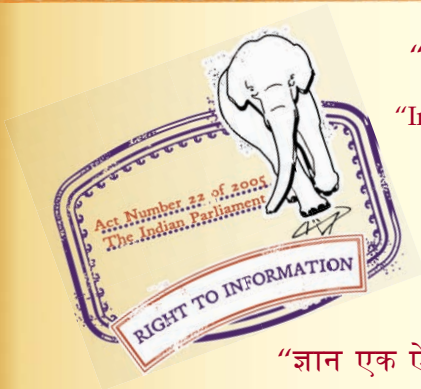
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“Step Out From the Old to the New”

IS 11544 (1986): Slipper, rubber [CHD 19: Footwear]



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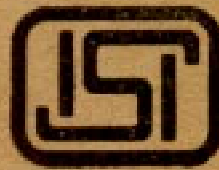
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Indian Standard

SPECIFICATION FOR SLIPPER, RUBBER

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

SPECIFICATION FOR SLIPPER, RUBBER

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Indian Standard

SPECIFICATION FOR SLIPPER, RUBBER

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 7 January 1986, after the draft finalized by the Footwear Sectional Committee had been approved by the Chemical Division Council.

0.2 Realizing the growing demand in the country as well as in the foreign markets and the potentiality of the development, the Footwear Sectional Committee has decided to formulate a standard on the product.

0.3 In the preparation of this standard, assistance has been derived from the publication DMSRDE/13: 1977 'Specification for slipper rubber black modified', Ministry of Defence, Government of India.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for slippers, rubber of any colour and are intended for hospital use or any other use as a light duty footwear.

2. TERMINOLOGY

2.1 For the purpose of this standard, definitions given in IS : 2050-1967† shall apply.

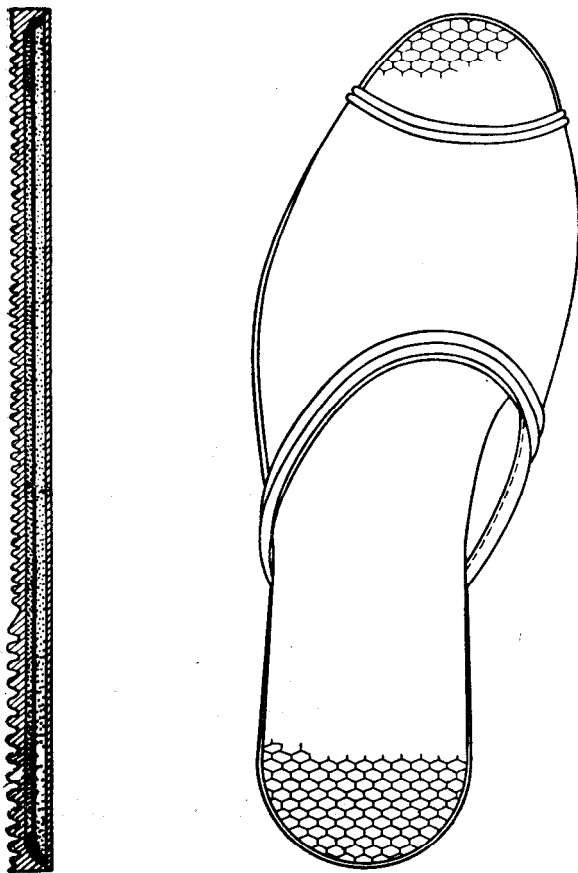
3. REQUIREMENTS

3.1 Shape and Design — The slippers shall be made to the pattern shape and design as shown in Fig. 1 and 2. Any other, pattern, shape and

*Rules for rounding off numerical values (revised).

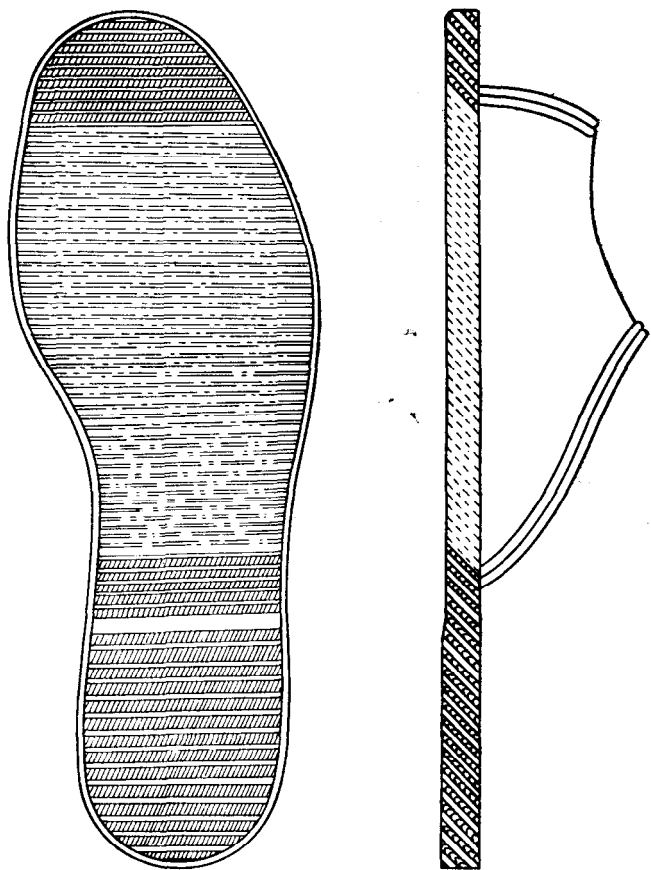
†Glossary of footwear terms.

design shall be subject to agreement between the purchaser and the manufacturer.



NOTE — This illustration is diagrammatic only and is not intended to illustrate details of design.

FIG. 1 DESIGN OF SLIPPER, RUBBER (FRONT VIEW)



NOTE — This illustration is diagrammatic only and is not intended to illustrate details of design.

FIG. 2 SOLE COMBINED WITH HEEL OF SLIPPER, RUBBER (BACK VIEW)

3.1.1 The slippers shall be made on suitable lasts, conforming to the dimensions as prescribed in Appendix A.

3.2 Materials

3.2.1 Rubber Components — The rubber components shall be made from suitable compounded natural or synthetic rubber or their blends, with or without the use of reclaimed rubber conforming to the physical requirements as given in Table 1.

TABLE 1 PHYSICAL REQUIREMENTS FOR RUBBER COMPONENTS

(Clause 3.2.1)

SL No.	CHARACTERISTIC	VAMP AND PIPING FOR VAMP	OUTER SOLE WITH HEEL COMBINED	RUBBER INSOLE COVER	FOXING (USED IN BETWEEN INSOLE AND OUTER SOLE)	INSOLE	METHODS OF TEST, REF TO
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Relative density, <i>Max</i>	1.30	1.30	1.30	1.30	1.40	IS : 3400 (Part 9)-1978*
ii)	Hardness, IRHD	55 ± 5	60 ± 5	55 ± 5	55 ± 5	55 ± 5	IS : 3400 (Part 2)-1980†
iii)	Change in initial hardness after accelerated ageing for 24 h at 100 ± 1°C (see NOTE)	+ 5 - 0	+ 5 - 0	+ 5 - 0	+ 5 - 0	+ 5 - 0	IS : 3400 (Part 4)-1978‡ and IS : 3400 (Part 2)-1980†

NOTE — The rubber test piece shall not show any signs of brittleness, tackiness or other apparent deterioration.

*Methods of test for vulcanized rubbers: Part 9 Density (*first revision*).

†Methods of test for vulcanized rubbers: Part 2 Hardness (*first revision*).

‡Methods of test for vulcanized rubbers: Part 4 Accelerated ageing (*first revision*).

3.2.1.1 Flexural endurance — The upper vamp, insole cover and outersole shall be aged at $100 \pm 1^\circ\text{C}$ at normal atmospheric pressure in an air-oven for a period of 24 h, without the rubber faces showing pinholes or any sign of cracking and without the separation of plies when viewed with the unaided eye. The materials shall also withstand not less than number of continuous cycles as given below when tested in accordance with Appendix B. Pinholes or cracking caused due to machine failures or damages shall be ignored.

<i>Part of the Slipper</i>	<i>Number of Cycles, Min</i>
Upper vamp and insole cover	60 000
Outer sole (combined with heel)	50 000

3.2.2 Bottom Filling Material — Self blown rubber sponge shall be used.

3.2.3 Adhesive — Rubber-based (see IS : 4663-1968*) adhesive shall be used.

3.2.4 Fabrics *Sheeting Brown for Outerlining, Sheeting White for Innerlining and Cloth Cotton. Binding Black Cut on Bias* — Shall be used having requirements as prescribed in Table 2.

TABLE 2 REQUIREMENTS FOR FABRICS

SL No.	CHARACTERISTIC	REQUIREMENT		METHOD OF TEST, REF TO
		Sheeting Brown for Outerlining and Sheeting White for Innerlining	Cloth, Cotton Binding Black Cut on Bias	
(1)	(2)	(3)	(4)	(5)
i)	Mass/m ² , g, <i>Min</i>	120	110	IS : 1964-1970*
ii)	Ends/cm, <i>Min</i>	85	120	IS : 1963-1981†
iii)	Picks/cm, <i>Min</i>	85	110	do
iv)	Colour fastness (not applicable for sheeting white)	Rating 4 or better	Rating 4 or better	IS : 687-1979‡

NOTE — Sulphur black dye shall not be used on any account. Sheeting brown and cloth, cotton binding black shall be dyed with vat dyes or dyes of equivalent fastness.

*Methods for determination of weight per square metre and weight per linear metre of fabrics (*first revision*).

†Methods for determination of threads per unit length in woven fabrics (*second revision*).

‡Method for determination of colour fastness of textile materials to washing : Test 1 (*second revision*).

*Specification for permanent rubber-based adhesives for footwear industry.

3.2.4.1 The above mentioned fabrics shall be free from sizing, finishing materials and substances liable to cause subsequent tendering. The weave of the fabrics shall be plain.

3.2.5 Thread — Cotton sewing thread conforming to variety No. 31 of IS : 1720-1978* shall be used. The colour of the thread shall match with the colour of the slipper.

3.2.6 Manufacture — The slippers shall be made on built-up vulcanized construction. Each rubber component of the slippers shall conform to the thickness and width as stipulated in Table 3 and for shape and design as indicated in 3.1.

TABLE 3 REQUIREMENTS OF INDIVIDUAL COMPONENTS OF SLIPPER, RUBBER

SL No.	COMPONENT	THICKNESS mm, <i>Min</i>	WIDTH mm, <i>Min</i>
(1)	(2)	(3)	(4)
i)	Vamp foxing without lining	1.5	—
ii)	Insole cover (socks) light fawn colour with honey comb design	1.3	—
iii)	Self blown sponge rubber (insole I) on finished slipper under socks	1.8	—
iv)	Insole rubber (between the two layers of sponge) (insole II)	1.0	—
v)	Blown sponge for bottom filling (on finished slipper)	2.5	—
vi)	Rubber piping (black for vamp)	1.3	6.5
vii)	Welt/rubber foxing laid in sole edge (before vulcanization)	3.5	7.0
viii)	Sole with heel combined	—	—
	a) <i>Fore Part</i>		
	With bar	3.5	—
	Without bar	2.0	—
	b) <i>At Heel</i>		
	With bar	4.5	—
	Without bar	2.5	—

3.2.6.1 The vamp shall be suitably designed and shall cover the waist of the sole reaching up to the heel breast.

3.2.6.2 The rubber vamp shall be reinforced with full lining of a double textured fabric material, consisting of an inner layer of white sheeting and outer layer of brown sheeting. These two fabrics shall be firmly adhered together with a layer of rubber adhesive and then firmly adhered with the rubber vamp. The exposed edges of vamp shall be bound with cloth cotton binding black, cut on bias, on a lock stitching

*Specification for cotton sewing threads (*second revision*).

machine using sewing cotton (see 3.2.5) with 35 ± 5 stitches per dm and the edges of rubber vamp shall further be reinforced with a wide black rubber piping. The width of the binding cloth shall be 25 ± 2 mm before folding.

3.2.6.3 The vamp shall be properly lasted and be firmly stuck down to the insole, ensuring a minimum lasting allowance of 20 mm on both the sides. The remaining gap at the bottom of insole shall be filled with a layer of self blown sponge rubber, extending from toe to seat of insole.

3.2.6.4 A fawn coloured one piece rubber foxing shall be firmly adhered round the edges of insole, in such a way that it is snugly fitted in between the cavity of the moulded outer sole and edges of insole without protruding.

3.2.6.5 The pre-moulded rubber outersole and heel in one piece shall then be positioned over the bottom filling and firmly stuck on over the lasted upper by means of rubber adhesive. A pre-vulcanized rubber insole cover of honey comb design shall be evenly and firmly stuck on the sponge insole extending to the edge of the sole at the toe and seat.

NOTE — It has been found from experience that rubber composition having 50 percent polymer content for insole (40 percent of it may be styrene-butadiene rubber), and 40 percent polymer content (40 percent may be styrene-butadiene rubber) for outersole found to give satisfactory results.

3.2.7 The slipper shall be made by the vulcanized process and all parts shall be properly and uniformly cemented and vulcanized.

3.2.8 Workmanship and Finish — The slipper shall be free from trimmings, airpockets, pinholes, cracks, excessive surface markings caused due to dirty moulds. The inside of the slipper shall also be free from wrinkles or pleats that caused discomfort to the wearers. The insole shall be smooth.

3.2.9 Preservation — Each slipper shall be freely dusted with french chalk (see IS : 380-1978*) prior to packing.

4. MARKING AND PACKING

4.1 Marking — Each slipper shall be marked with following, particulars on the waist of insole cover:

- a) The manufacturer's name or his recognized trade-mark, if any;
- b) Size number;
- c) Batch/Code Number; and
- d) Month and year of manufacturer.

*Specification for french chalk, technical (second revision).

4.2 Packing — The slippers shall be packed in new, dry and clean condition. Each pair shall be wrapped in polyethylene paper and packed in a suitable carton and each carton shall bear a label with the following markings:

- a) Name of the material;
- b) Name of the manufacturer or his recognized trade-mark, if any;
- c) Month and year of manufacture;
- d) Size number; and
- e) Batch/Code number.

4.2.1 The slippers may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Mark) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. SAMPLING AND CRITERIA FOR CONFORMITY

5.1 The code of sampling and criteria for conformity shall be as prescribed in IS : 6368-1971* or as agreed to between the purchaser and the manufacturer.

APPENDIX A

(Clause 3.1.1)

DIMENSION OF LAST

<i>Size of Slipper</i>	<i>Length of Last on Size Stick*</i>	<i>Joint Girth†</i>	<i>Tread Width‡</i>
	mm	mm	mm
8	271	245	91

*Increasing or decreasing by 8.0 mm for each size.
†Increasing or decreasing by 6.0 mm for each size.
‡Increasing or decreasing by 2.0 mm for each size.

*Methods for sampling of rubber combination footwear.

APPENDIX B

(Clause 3.2.1.1)

DETERMINATION OF FLEXING RESISTANCE

B-1. FLEXING RESISTANCE TEST FOR SOLE

B-1.1 Outline of the Method — This test determines resistance to initial cracking of rubber components of footwear cut out directly from the material, by the Ross flexing machine.

B-1.2 Apparatus

B-1.2.1 Ross Flexing Machine — A schematic diagram of Ross flexing machine is given in Fig. 3. The machine allows the fixed area of the specimen to bend freely over a rod of approximately 9.5 mm in diameter through an angle of 90°. A rule of suitable length, graduated in steps of 0.25 mm is used for measuring the length of cut growth.

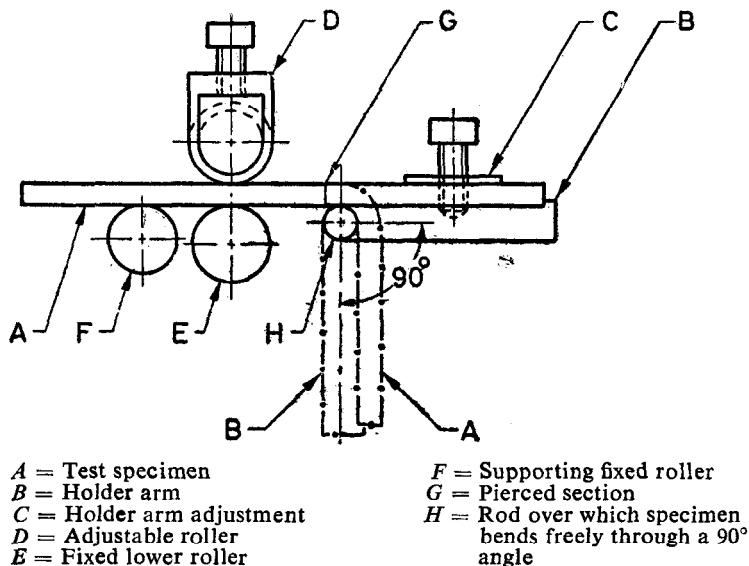


FIG. 3 SCHEMATIC DIAGRAM OF TOSS FLEXING MACHINE

B-1.3 Procedure

B-1.3.1 Test Specimen — Cut out directly from the outsoles, test specimens of dimensions 25 ± 1 mm width and a minimum of 150 mm

in length by the standard knife for cutting samples for Ross flexing machine.

B-1.3.2 Clamp the test specimens to the holder arm of the flexing machine in such a position that the designed surface of the sole could be flexed at 90° . The holder arm shall be in a horizontal position when the test specimens are attached. Let down the adjustable top rollers until they just touch the holder and be locked in this position by means of the wing nuts, permitting free travel of the test specimens between the rollers during the bending movement.

B-1.3.2.1 After the test specimens have been attached as described, start the machine at 200 ± 5 cycles per minute. Make frequent observations and record the number of cycles at the initial crack. Record the number of cycles by the use of the counter.

B-1.4 Report — Average the results from observation at least two test specimens and report as the number of cycles for crack.

B-2. FLEXING RESISTANCE FOR UPPER VAMP AND INSOLE COVER

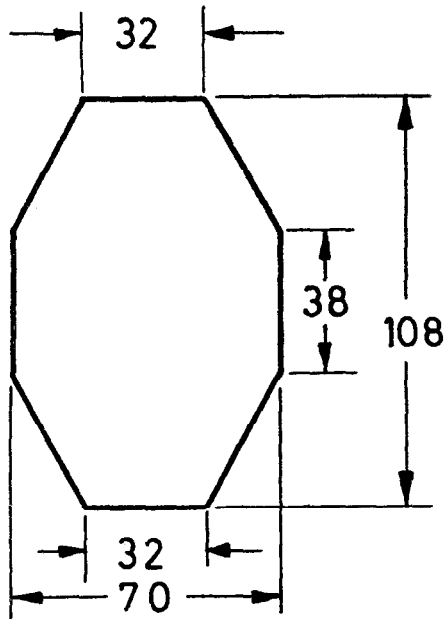
B-2.1 Apparatus — The machine has an adjustable stationary part, provided with grips 25.0 mm across for holding one end of each of the test piece in a fixed position and a similar but reciprocating part for holding the other end of each of the test pieces. The reciprocating part is arranged so that the motion is in the direction of and in the same plane as the centre line between the grips. Its travel is adjusted so that the two sets of grips approach each other to a distance of 13 mm and separate to a distance of 57 mm. The eccentric which actuates the reciprocating part is driven by a constant speed motor to give 340 to 400 flexing cycles per minute for vamp cover and in case of insole cover it shall be 100 ± 5 cycles per minute. The motor should have sufficient power to flex at least six and preferably twelve test pieces at one test. The test pieces should be arranged in two equal groups so that one group is being flexed while the other group is being straightened, thus reducing the vibration in the machine. The grips shall hold the test pieces firmly and enable individual adjustment to be made to the test pieces.

B-2.2 Test Piece — The test piece shall have the dimensions shown in Fig. 4. Where the size and the style of the footwear permits, take four test pieces from an article of footwear. In other cases take three or two test pieces, whichever is possible, from one article of footwear. Cut the test pieces from the thinnest portion of the upper containing the fewest plies of fabric. Take care to ensure that the test pieces are cut out cleanly from the sample material.

B-2.3 Procedure — Fold the test piece symmetrically about its major axis so that the rubber surface is outwards. In the folded condition insert one tapered end into the fixed central grip and push in until the sample touches the grip pins. Tight this fixed grip. Take out the corresponding movable grip to its fullest extent; insert the test piece and pull flat and tighten the grip. It is recommended that clips may be used to keep the edges during the insertion of the test piece in the grips, but their removal is essential before flexing commences.

NOTE — The test piece should not be under tension.

B-2.4 Expression of Results — A complete to-and-fro movement of the grip is counted as one flex cycle. Report the number of cycles required to start cracking. The flex cycle may be determined by using a trip counter operated by one of the movable grips. The ambient temperature during testing shall be not more than 27°C.



All dimensions in millimetres.

FIG. 4 TEST PIECE FOR FLEXING TEST

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>	<i>Definition</i>
Force	newton	N	$1 \text{ N} = 1 \text{ kg.m/s}^2$
Energy	joule	J	$1 \text{ J} = 1 \text{ N.m}$
Power	watt	W	$1 \text{ W} = 1 \text{ J/s}$
Flux	weber	Wb	$1 \text{ Wb} = 1 \text{ V.s}$
Flux density	tesla	T	$1 \text{ T} = 1 \text{ Wb/m}^2$
Frequency	hertz	Hz	$1 \text{ Hz} = 1 \text{ c/s(s}^{-1}\text{)}$
Electric conductance	siemens	S	$1 \text{ S} = 1 \text{ A/V}$
Electromotive force	volt	V	$1 \text{ V} = 1 \text{ W/A}$
Pressure, stress	pascal	Pa	$1 \text{ Pa} = 1 \text{ N/m}^2$